

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) IMPROVEMENTS IN AND RELATING TO CLEANING WINDSHIELDS

(71) I, LELIO CODELUPPI, a citizen of the Republic of Italy, of 12, Via Santa Giustina, Villa Argine, city of Cadelbosco di Sopra, Province of Reggio Emilia, Italy, do hereby declare the invention, for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to a windshield washing system, for example, for a motor vehicle.

One of the problems which all drivers of motor vehicles must solve in the most different circumstances is to keep the windshield clean when the vehicle is moving. In fact, dust, smog, fog, mud or other elements soil the windshield thereby reducing its transparency. This can create hazardous and often dangerous driving conditions.

Another important problem is the formation of ice on the windshield, either when the vehicle is stationary or moving. If, in addition to ice, there is also fog, a heavy layer of smog is deposited on the windshield creating even worse conditions, the extremely limited visibility increasing strain and stress of driving.

The systems presently used are intended primarily to keep the windshield free from rain, snow, but when there is a fog, the windshield often becomes very dirty.

Windshield wipers have the chief function of clearing foreign matter from the windshield as quickly as possible while water sprays have the function of moistening the dirt which is deposited on the windshield, so as to facilitate the action of the wipers. Such water sprays, though useful, cannot be used when the external temperature is such to cause ice formation because a water film formed on a windshield freezes almost immediately. When a film of ice forms windshield wipers have little effect and the driver is obliged to stop his vehicle, even if there is a thick fog, in order to remove the film of ice using, for example, a cloth, palette knife of hard rubber or plastics, or means

other than cleaning systems permanently installed in the vehicle.

Clearly, the conventional systems do not adequately deal with such problems. Attempts have been made to overcome these problems by, for example, heating the interior of the vehicle or directly heating the inner surface of the windshield. Alternatively, antifreezing products have been used, but these form an oily film on the windshield and detergents have been added to the water sprayed onto the windshield. Although some attempts have met with limited success, there are still problems to be overcome.

A windshield washing system according to this invention may also be used on the windshields of any other vehicles, for example, aircraft, where equally dangerous conditions can arise.

According to this invention a windshield washing system, for example, for a motor vehicle comprises windshield wipers, means for delivering liquid onto the surface of the windshield, an electric heater for connection to a source of electrical power and a thermostat for controlling the temperature of the liquid, wherein in use the electrical heater is operable independently of the liquid delivering means. The delivering means may comprise a container formed from metal, one wall of the container forming an electric resistance element of the heater.

Alternatively, the electric heater may comprise an electric resistance heating element fitted in a container forming part of the liquid delivering means.

Use of an electric heater allows heating of the water even when the engine is cold and not running, whereas with known systems employing other heat sources, for example the engine, it is first necessary to start the engine and allow it to reach a desired temperature.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, of which:—

Figure 1 is a schematic view of one embodiment of the invention but the windshield wipers are not shown;

Figure 2 is a schematic view of another embodiment of the invention but as in Figure 1, windshield wipers are not shown.

With reference now to Figure 1, 1 is a reservoir of the liquid, for example water, to be sprayed connected by a duct 3 to a conventional hand or foot actuated pump 2 for pumping liquid through a duct 4 to a container 5 fitted with an electric heater comprising a resistance heating element within an envelope 7 formed from a heat conducting but electrically insulating material. Heated water is fed through a duct 8 to spraying nozzles 9. The resistance heating element 6 is connected by wires 11 and 12 to the battery (not shown), this circuit being operable when the ignition is turned on and/or provided with a separate switch, and the temperature of the liquid in the container 5 is controlled by a thermostat 10 operating a relay 13 for isolating the heater 25 from the battery.

Referring now to Figure 2, the electric heater (6 and 7) is fitted in the reservoir 1 and not in a container intermediate the pump and the spraying nozzles as in Figure 30 1, and the thermostat 10 is arranged mounted on the electric heater 6 and 7. Preferably, the reservoir 1 is cylindrical in shape.

In any case, it is preferable to keep the liquid at a constant temperature and this is obtained by the thermostat 10 which may be adjustable. The thermostat may be replaced by any electric systems adapted to maintain a constant temperature. Of course, the spraying nozzles shown in the drawing 40 may be of the type already existing in motor vehicles, or they may be different and arranged in different positions, such as for instance directly on the windshield wipers.

With very low external temperatures, anti-freeze may be added to the liquid, especially when the embodiment of Figure 1 is used, but under such temperature conditions it is preferable to use the embodiment of Figure 2 with another heater in an additional 50 smaller container arranged close to the spraying nozzles so as to ensure that hot water reaches the windshield.

One or more electric resistance heaters may be used with advantage depending upon 55 the various devices fitted to a particular vehicle. For example, in some models of vehicles the liquid container is located in a comparatively cold position and in others long hoses are used to inter-connect the container and the spraying nozzles so that hot 60 water will cool down before reaching the nozzles. In such cases two heaters may be required.

It is also to be understood that the electric

resistance heating element may be formed by the walls of the container itself, the walls 65 being made of metal and acting as a resistance and electrically and thermally insulated. In one form, the container may be a metal tube through which water to be heated is passed and which is connected in series 70 in the corresponding electric circuit.

Furthermore, the container may be made as a spiral wound metal pipe, around which there may be an electric resistance, the pipe and resistance being connected in series. The 75 pipes and the containers may be lagged to reduce heat losses. For heating water it is possible to use mixed systems, that is a combination of electric resistances with one or more other heat sources on the engine. 80 Electric resistances may be placed around the spraying nozzles, the basic object being always the same, that is to deliver hot water on the external surface of the windshield. 85

#### WHAT I CLAIM IS:—

1. A windshield washing system, for example, for a motor vehicle comprising windshield wipers, means for delivering liquid onto the surface of the windshield, an electric heater for connection to a source of 90 electrical power and a thermostat for controlling the temperature of the liquid, wherein in use, the electrical heater is operable independently of the liquid delivering means. 95

2. A system according to claim 1, wherein the delivering means comprises a container formed from metal and wherein a wall of the container forms an electric resistance heating element of the electric 100 heater.

3. A system according to claim 1, wherein the electric heater comprises an electric resistance heating element fitted in a container forming part of the liquid delivering 105 means.

4. A system according to claim 2 or claim 3 comprising a main reservoir for the liquid connected with the said container.

5. A system according to any one of 110 claims 2 to 4, wherein the delivering means comprises a pump for pumping liquid from the container and through water spraying elements onto the windshield.

6. A system according to any one of the 115 preceding claims, wherein the thermostat is adjustable.

7. A windshield washing system, for example, for a motor vehicle, constructed and arranged substantially as herein described 120 with reference to and as illustrated in the accompanying drawings.

WITHERS & ROGERS  
Chartered Patent Agents  
148-150 Holborn,  
London, EC1N 2NT  
Agents for the Applicant

